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SINORICA, LLC 528 FALLSGROVE DRIVE ROCKVILLE, MD 20850				
EXAMINER				
MOLL, JESSE R				
ART UNIT		PAPER NUMBER		
2181				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/787,211

Applicant(s)

JEN ET AL.

Examiner

JESSE R. MOLL

Art Unit

2181

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Withdrawn Rejections

1. Applicant, via amendment has overcome the rejection of claims 6-10 under 35 U.S.C. 101. The rejection has been respectfully withdrawn.

Claim Objections

2. Claim 1 is objected to because of the following informalities: "mapping" on the third last line should be "map". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 6-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation "the data exchange is a direct data access in accordance with the mapping relationship". It is unclear how this limits the claim. Applicant's system exchanges data by operating a crossbar switch (as shown in figure 2). It is both unclear what is meant by "a direct data access" and how setting a crossbar switch can be "a direct data access". It is unclear whether the phrase limits the exchange itself or the data's accessibility following the exchange. Additionally, the term "direct" is vague. It is unclear whether the data is direct (i.e. location) or if the

access is direct (method of access) It is unclear at which point something is directly accessed (through a buffer/driver, through a multiplexer, through a decoder, through a shifter, etc...). Also, it is unclear in relation to what the access is direct. Claims 7-10 are rejected due to their dependence on indefinite parent claim 6.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berenbaum et al. (U.S. Patent Number 6658551 B1) herein referred to as Berenbaum in view of Zalamea et al. (Hierarchical Clustered Register File Organization for VLIW Processors), herein referred to as Zalamea.

7. Regarding claim 6, Berenbaum discloses A method for inter-cluster communication in a processing system that employs register permutation comprising, providing clustered functional units (Functional Units [FU]; see fig. 8) and the clustered function units having at least one global register file (Including all register Files; see Fig. 8; Note that the term "register file" is interpreted as a group of registers and a group of register files is still a register file); partitioning the at least one global register file into at

least one sub-register file (each of the individual register files; see Fig. 8), wherein the at least one sub-register file maps to at least two clustered functional units respectively (each file can map to any of the functional units; see Fig. 8; col. 7, lines 8-15); wherein establishing a mapping relationship between a global register file and a clustered functional unit (by setting the crossbar switch 820; see Fig. 8); and the clustered functional units exchanging data by permutations of the sub-register files of the at least one global register file through setting crossbar switches (see Fig. 8; Col. 7, lines 12-15), without transferring the data (banks are chosen by changing the crossbar switch not by copying data to the other register files; by controlling the crossbar switch, the connections between register files and functional units is changed without moving data), wherein the permutations mapping the sub-register files of the at least one global register file to the clustered functional units (by setting the crossbar switch 820; see Fig. 8; col. 7, lines 12-15) and the data exchange is a direct (setting a crossbar is direct) data access (setting crossbars makes data accessible) in accordance with the mapping relationship (this relationship determines which FU is going to be receiving the data; see fig. 8).

Note that crossbar logically switches positions of the global registers, it is interpreted as exchanging data between the registers when viewed in light of the specification. The specification shows that register data is only virtually exchanged in the same way that Berenbaum discloses.

Berenbaum does not explicitly disclose at least one local register file; mapping each of the at least one local register file to one of the clustered function units, wherein

establishing a mapping relationship between a global register file, a local register file and a clustered functional unit.

Zalamea teaches at least one local register file (Local register files C16; see Figure 3); mapping each of the at least one local register file to one of the clustered function units (See Figure 3), wherein establishing a mapping relationship between a global register file, a local register file and a clustered functional unit (see Figure 3; Section 4, first paragraph).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to have modified the invention of Berenbaum, by adding at least one local register file maps to one of the clustered function units, wherein establishing a mapping relationship between a global register file, a local register file and a clustered functional unit, as taught by Zalamea, in order to increase execution speed of instructions that do not need to transfer data to global register files by using local register files.

8. Regarding claim 7, Berenbaum further discloses the register permutation is done by dynamically changing the port mapping between the sub-register files of the global registers and the functional units (with Input Crossbar Switch, see fig. 8).

Note that routing data from one place to another is considered mapping. Therefore, changing the destination of the register is considered changing the port mapping.

9. Regarding claim 8, Berenbaum further discloses the port mapping is done with a predetermined routing structure (Input Crossbar Switch; see fig. 8).
10. Regarding claim 9, Berenbaum further discloses the size of said portioned register file and number of said ports are both scalable (see cols. 5-7; note the variables N and K showing the scalability).

Further note that in any register file, the size is scalable. It would always be possible with minimal redesign to change the number of registers or ports. The claim merely states that the register file be able to have different sizes (be scalable).

11. Regarding claim 10, Berenbaum further discloses any number of cluster structures (M; see fig. 8).

Response to Arguments

12. Applicant's arguments with respect to claims 6-10 have been considered but are not persuasive.
13. Applicant states:

[Argument 1]: The cited prior art, Berenbaum et al, teaches a multithreaded processor processes each thread with a designated register file. All threads share the same functional unit. The crossbar switch as taught by Berenbaum et al accesses the operands from the designated register file of each thread for process. However, the current invention disclosed one register file for a function unit being partitioned into global and local register files. The architecture of the current invention is different from what was taught by the cited prior art.

As stated in the rejection, Examiner admits that local register files are not taught by Berenbaum. This deficiency is taught by Zalamea as shown above.

14. Applicant states:

[Argument 2]: The cited prior art, Zalamea et al, teaches partitioning the shared registered file into clustered registered file. Zalamea et al teaches storing data at the shared register file for operation access. However, the current invention does not transfer the data for operation access. The cluster communication disclosed by the current invention is maintaining the data at the original register file without transfer the data before the operation access. The operation data access of the current invention is a direct access in accordance with the mapping relation.

[Argument 3]: The current invention teaches "the clustered functional units exchanging data by permutations of the sub-register files, without transferring the data".

Examiner disagrees. The claim explicitly states that the data exchange is done "without transferring data". Therefore, exchanging data cannot include transferring the data to the functional unit. The claimed invention must only include setting a crossbar in order to make the data available to the functional unit. Berenebaum clearly discloses this. Setting a crossbar switch to route (or make available) register files to different functional units is exchanging data (and what is done in Applicant's invention). Even with the addition of Zalamea (the global registers would be connected through the local register to the functional unit), the crossbar switches are still set and the data becomes available to be transferred to the functional unit (albeit through the local register file). Since the claim does not recite any limitations directed to the actual movement of the data from the global register file to the functional unit, the claim merely requires

crossbar switches to be set in order to change the accessibility of the data (which is made obvious by the combination shown above).

15. Applicant states:

[Argument 4]: The current invention teaches "the data exchange is a direct data access in accordance with the mapping relationship". The cited prior art failed to teach the claimed limitation. Examiner is respectfully requested to provide a prima facie evidence for such a rejection.

See above regarding the rejection under 35 USC 112 second paragraph.

Additionally, setting crossbars (as done in Applicant's system) is a direct manner of exchanging data.

16. Applicant states:

[Argument 5]: The current invention claims "the clustered functional units exchange data by permutation of the sub-register files of the at least one global register file through setting crossbar switches". The cited prior art, Berenbaum et al, failed to teach the claimed limitation. Examiner is respectfully requested to provide a prima facie evidence for such a rejection.

Examiner disagrees. As shown in the rejection above, the limitation is taught.

Additionally, data is exchanged and sub-registers are permuted when the crossbar is set.

17. Applicant states:

[Argument 6]: The current invention claims "the permutation maps the sub-register files of the at least one global register file to the clustered functional units." The cited prior art, Berenbaum et al, failed to teach the claimed limitation. Examiner is respectfully requested to provide a prima facie evidence for such a rejection.

Examiner disagrees. As stated above: "Setting a crossbar switch to route (or make available) register files to different functional units is exchanging data (and what is done in Applicant's invention). Even with the addition of Zalamea (the global registers would be connected through the local register to the functional unit), the crossbar switches are still set and the data becomes available to be transferred to the functional unit (albeit through the local register file)." Exchanging or creating this connection (even through the local register files) is mapping.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse R. Moll whose telephone number is (571)272-2703. The examiner can normally be reached on M-F 10:00 am - 6:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alford Kindred can be reached on (571)272-4037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jesse R Moll
Examiner
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